USGS

WATER RESOURCES RESEARCH GRANT PROPOSAL

Title: Development of an Accurate Rainfall Data Base, Rainfall Climatology, and Rainfall Distribution Maps for Guam

Focus Categories:

Keyword Numbers: 18 (Atmospheric Processes), 40 (Climate), 55 (Data Analysis), 188 (Rainfall), 195 (Remote Sensing)

Duration: June 1999 - May 2000

Fiscal Year 1999 Funds: $20,962.51 ($20,962.51) (N/A) Total Direct Indirect

Non-Federal Funds Allocated: (None) (None)

Principal Investigator: Charles P. Guard, Research Associate, University of Guam, Mangilao, Guam Co-Investigator: Mark A. Lander, Assistant Professor, University of Guam, Mangilao, Guam

Congressional District of University Performing the Research: N/A

Statement of Critical Regional Water Problems

Guam is characterized by one of the highest levels of rainfall variability in the world, with the highest annual rainfall nearly three times the lowest rainfall. This makes the region susceptible to droughts and floods, in addition to the large typhoon risk that threatens the island. This high rainfall variability directly effects ground and surface water supplies, water quality, erosion, pollution from run-off, and local flooding. In order to adequately and credibly deal with these issues, users on Guam need an accurate and representative rainfall data base, rainfall climatology, and set of rainfall distribution maps.

The study of rainfall distributionon Guam using new information sources (e.g., Doppler Radar)" was identified at the November 19, 1998 Guam-WERI Water Advisory Council meeting as one of the critical needs of the Island. Accurate rainfall data bases and a representative rainfall climatology are fundamental to an accurate analysis of rainfall distributions. Rainfall distribution charts are critical for water management, research, and the development of public water policy.

Statement of Results, Benefits, and/or Information Expected

An accurate rainfall data base and a representative rainfall climatology are fundamental to all hydrologic studies of Guam. This proposal will result in a complete and accurate rainfall data base from which an accurate and representative rainfall climatology can be

derived. The data base and climatology will allow researchers to take the next logical step of creating valid rainfall distribution charts for the islands. It will also allow researchers and water managers to select a representative rainfall climatology segment on which to base decisions. This is essential in an area with so much rainfall variability exists. To a large extent, this variability can be explained, but this knowledge has not been conveyed to the rainfall climatology nor to rainfall distribution maps. The results of this research will add credibility to regional hydrologic studies, and will give water resource managers and rainfall forecasters accurate input data on which to base critical decisions. This study will greatly benefit the Guam Hydrological Survey program and will ultimately benefit those making public water policy.

Nature, Scope, and Objectives of the Research

This proposal is designed to provide a complete and accurate rainfall data base, rainfall climatology, and set of representative rainfall distribution maps for Guam. The data base will include monthly and annual rainfall values for a multitude of past and present rainfall observation sites. From this data base, we plan to derive representative rainfall climatology for researchers and water managers. Once the rainfall data bases and the climatology are firmed up, representative rainfall distribution maps will be developed. In developing the rainfall climatology, we will introduce the use of Doppler radar data and meteorological satellite data to determine the rainfall character (intensity, frequency and duation), which changes with differeing atmospheric processes. These radar and satellite data will be used to refine the rainfall climatology. They will also be important in identifying rainfall distribution patterns and characteristics. Attachment 1 is an example of the radar data showing total accumulated rainfall distribution associated with the passage of Typhoon Isa from 9-18 April 1997. Attachment 2 is an example of satellite data available to the investigators on-site.